UTILITY APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE: COMBUSTIBLE SHAPED AMMUNITION PART

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COMBUSTIBLE SHAPED AMMUNITION PART

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit, under 35 U.S.C. 119, of DE 10103912.3 filed January 30, 2001, which is relied upon and is expressly incorporated by reference herein.

FIELD OF THE INVENTION

1. The invention relates to a combustible shaped ammunition part, such as a propellant case or a propellant charge container, wherein the shaped ammunition part contains an erosion-reducing agent.

BACKGROUND OF THE INVENTION

2. High-energetic propellant powders, such as the ones required for firing high-performance projectiles, generate high temperatures and pressures inside the respective weapon tube and lead to increased wear due to erosion of the weapon tube.

3. Adding talcum, wax, or similar materials to the propellant powder has been suggested to reduce this type of erosion. However, these admixtures have proven to have a relatively low erosion-reducing effect.

4. German reference DE 39 27 400 A1 furthermore discloses adding wax or paraffin as erosion-reducing agent not to the propellant powder itself, but to the shaped ammunition part that consists of a combustible plastic shrinking foil. However, this practice also did not essentially reduce the erosion effect of the propellant powder on the inside wall of the respective weapon tube.

5. It is an object of the invention to provide a shaped ammunition part, consisting of a combustible material that contains erosion-reducing admixtures. These admixtures should result in a better reduction of the erosion effect, caused by the propellant powder on the inside surface of a weapon tube, than the erosion caused by comparable, known admixtures.

DESCRIPTION OF THE INVENTION

6. Solution of the problem according to the invention comprises a combustible shaped ammunition part, such as a propellant case or a propellant charge container, wherein the combustible shaped ammunition part contains an erosion-reducing admixture. The erosion-reducing agent is an oxide of one of the elements of rare earth or one of the elements of the 6th subgroup in the periodic system, or a poly oxy methylene (POM). Poly oxy methylene resin(s) are acetal resin(s). These resins can be designated by the empirical formula:

$$[- CH_2 - O -] CH_2] O - CH_2] O - CH_2]_x,$$

in which $x \geq 1500$ [$- CH_2 - O -$] units. Brand names of two such resins include "Delrin" and "Celcon."

7. Essentially, the invention is based on the idea of using at least one oxide of one of the elements of rare earth, in particular La_2O_3, CeO_2, Y_2O_3 and/or at least one element of the 6th subgroup in the periodic system, especially MoO_3 or WO_3, and/or poly oxy methylene (POM), or a combination of these agents as erosion-reducing admixture. The amount of this reagent(s) can range from 2 to 15% of the composition comprising the combustible shaped ammunition part.

8. The surprisingly good erosion-reducing effect of these oxides is presumably due to their ablative effect, which leads to a cooling of the inside wall of the weapon tube from which the respective ammunition is fired. The ablative effect of the oxides is explained through the high negative formation heat ΔH of these oxides and the relatively low boiling points. The weapon tube is cooled by the enthalpy of vaporization of these oxides, which are located practically directly against the inside wall of the weapon tube because of their intercalation into the wall regions of the shaped ammunition part, so that the erosion is lowered noticeably.

9. For one exemplary embodiment where tungsten trioxide (WO_3) was used as erosion-reducing admixture in the propellant case, the erosion of the inside surface of a respective weapon tube dropped by 47% as compared to standard ammunition, for which no erosion-reducing admixtures were used in the propellant case.

10. To produce the shaped ammunition part according to the invention, 2 to 15 weight % of one or several erosion-reducing agents are mixed into the watery slurry (pulp) of the starting material for producing a shaped ammunition part. Subsequently, the shaped part is produced in the manner known per se (e.g. by using a forming core etc.).